

A Host Index of Fungi of the Malay Peninsula, I.

Although we are only at a beginning of our study of the cryptogamic flora of Malaya, it has been found that in collecting together the information already published in separate papers the material has been provided for a nucleus of a Host Index for this country. It has been considered advisable that this information should be published forthwith in index form and added to as further records are established, rather than delay publication for some years in order to obtain a more complete work.

In considering the form this work should take it has been deemed expedient to include all fungi recorded on a plant rather than only those that have hitherto been definitely determined as parasites. The advantage of such a list being in the first place that it is very difficult to establish definitely which are parasites and which are saprophytes, and secondly fungi determined as saprophytes now may in a little while be found to be parasites. In this matter the following list differs somewhat from the Host Indexes that have been issued for other countries.

Many well known diseases often regarded as quite common will not be found included as it often proves on investigation that such popular beliefs have not been actually recorded by the scientist.

The arrangement of the list is alphabetically under the host plants. A systematic arrangements of hosts was considered to limit the use of such a list as this to those few scientists who are familiar with systematic botany, and as it is hoped this list will prove useful to a larger circle the alphabetical arrangement has been adopted. For a similar reason the descriptions of the fungi have been given in popular language rather than scientific.

The material from which this list has been compiled is the works of H. N. Ridley, W. J. Gallagher, K. Bancroft, A. Sharples, W. N. C. Belgrave, R. M. Richards, and C. F. Baker published during the past few years in local bulletins and periodicals.

AFZELIA RETUSA, Kurz. (*Leguminosae*) Merabau.

Bancroft records the leaves of 'Merabau' collected in Perak, attacked by a fungus he considered to be *Trabutia Stephaniae* (*Sphaeriaceae*).

AFZELIA, sp. (*Leguminosae*) Merabau.

Fomes lignosus. (*Polyporaceae*) the well known disease of Para rubber, was recorded by Gallagher as spreading from 'Merabau.'

AGATHIS ALBA, Foxw. (*Coniferae*.)

Aecidium balansae. (*Uredinaceae*) was found on leaves of this species collected by Burkill on Penang Hill. It causes warty gall like protuberances on the upper surface of the leaves.

AGAVE RIGIDA, Mill. (*Amaryllideae*).

Dead preduncles collected by C. F. Baker, at Singapore, were found to have a species of *Phoma*, which was described by Saccardo as a new species, *P. agaves*, (*Sphaerioidaceae*). It is a minute fungus causing little raised black spots where the frutification breaks through the epidermis of the host.

AGAVE, sp. (*Amaryllideae*).

A species of *Coryneum* (*Melanconiaceae*) is recorded by Burkill in Singapore and Johore as attacking the leaves and rendering them useless for the extraction of fibre. It first appears as white blotches which on spreading change to a deep brown colour and become sunken. When the leaf is dead it has a silvery look and the fungus appears externally breaking through the epidermis as small black pustules, which are often in more or less concentric rings.

ANDROPOGON NARDUS, Linn. v. CITRONELLA, (*Gramineae*).

A Rust, *Puccinia clarispora* (*Uredinaceae*) causing long reddish brown streaks on the leaves is recorded by C. F. Baker from specimens collected in the Singapore Gardens.

ARACHIS HYPOGAEA, Linn. (*Leguminosae*). Ground nut, Pea nut, or Monkey nut.

Bancroft records from Selangor a leaf spotting parasitic fungus, *Cercospora personata*, (*Dematiaceae*). The fungus appears as small, brown, orbicular spots 2-4 mm. or more in diameter. The spore bearing hyphae are short, brown, and densely tufted.

ARECA CATECHU, Linn. (*Palmaceae*). The Betel Nut.

C. F. Baker found a fungus on the dead leaves at Singapore. Saccardo described it as a new species *Erosporium* (*Bakerella*) *eximium* (*Tuberculariaceae*). The fungus appears as minute black tufts chiefly along the main veins of the leaves.

ARTOCARPUS INTEGRIFOLIA, Linn. (*Urticaceae*). The Jack Fruit.

A case of 'Pink Disease,' *Corticium salmonicolor*, (*Thelephoraceae*) is recorded in Malay by F. T. Brooks. Ridley in 1889 also collected specimens of *Hexagona polygramma* (*Polyporaceae*) from a dead Jack-tree at Jurong. This latter fungus is a thin, brown, circular, bracket shaped specimen with large regular hexagonal pores on the under surface. So far as is known the genus *Hexagona* is saprophytic.

ATTALEA COHUNE, Mart. (*Palmaceae*). The Cohune Nut Palm.

Gloeosporium palmigenum (*Melanconiaceae*) was found by C. F. Baker at Singapore on dead leaves of this palm. The fungus appears as minute spots, brown but ringed with a black edge.

BAMBUSA, sp. (*Gramineae*).

Specimens of *Polystictus occidentalis* (*Polyporaceae*) are recorded by Ridley as occurring on the outside of a bamboo clump. On cutting open a culm the mycelium of the fungus was found to be lining the inside in a thick, firm, leathery mass.

BOEHMERIA NIVEA, Gaudich. (*Urticaceae*). Ramie fibre.

Mentioned by Ridley as attacked by 'Pink Disease.' *Corticium salmonicolor* (*Thelephoraceae*).

BROWNEA GRANDICEPS, Jacq. (*Leguminosae*).

C. F. Baker records from the Singapore Gardens a fungus described by Saccardo as a new species *Microthyrium browneanum* (*Microthyriaceae*). This fungus appears on the leaves as minute black dots.

BRUGUIERA ERIOPETALA, W. et A. (*Rhizophoraceae*).

Two fungi are recorded from the leaves of this host by C. F. Baker from Ponggal, Singapore. *Helminthosporium subsimile* (*Dematiaceae*) and *Podosporium consors* (*Stilbaceae*).

CALAMUS, spp. (*Palmaceae*). The Rotan.

Only three fungi, found by Baker in the Singapore Gardens are recorded for this important section of Palms. On dead petioles and leaf rachises *Melanconium melanoxanthum* (*Melanconiaceae*), appearing as small white dots ringed with black. On dead stems *Coniosporium vacuolatum* (*Dematiaceae*) appearing as small black spots and splashes. *Hadrotrichum atromaculans* (*Dematiaceae*) also on dead stems causing black incrustations, and mixed with *Melanconium melanoxanthum*.

CALLOPHYLLUM FLORIBUNDUM, Hook. f. (*Guttiferae*).

Leptothyrella calophylli (*Leptostromataceae*) a black sooty fungus is recorded as a parasite on the living leaves, by Baker at Singapore Gardens.

CASSIA FISTULA, Linn. (*Leguminosae*). Purging Cassia.

Meliola aethiops (*Perisporiaceae*) a black cobwebby fungus found on living leaves in Singapore Gardens, by Baker.

CASSIA TORA, Linn. (*Leguminosae*).

A rust, *Aecidium torae* (*Uredinaceae*) was found by Burkill on a specimen growing at Tanjong Pagar, Singapore. It appears as little bright clusters of cup shaped frutifications on the leaves.

CASSIA, spp. (*Leguminosae*).

Other species of this genus are reported as being found with Pink Disease, *Corticium salmonicolor* (*Thelephoraceae*) by Brooks;

Peroneutypa heteracanthoides (*Sphaeriaceae*) appearing as minute black pustules on the wood, and *Hypoxylon microsporum* (*Sphaeriaceae*) which causes black charcoal-like eruptions on the bark. These latter two are recorded by Baker from Singapore.

CERCROPIA PELTATA, Linn. (*Urticaceae*). The Sloth Tree.

Botryodiplodia cerebrina (*Sphaerioidaceae*) appearing as black eruptions on the bark was collected by Baker at Singapore.

CINNAMOMUM CAMPHORA, Nees. (*Laurineae*) Camphor.

One of the worst troubles affecting this plant is a "thread blight" which weaves a regular white cobweb over young specimens even up to 12 ft. high, and eventually smothers them. It was described by Bancroft in 1911 and was referred doubtfully to a species of *Corticium* or *Hypochnus*. No practical remedy has yet been suggested for removing it as it is difficult to treat young trees growing in the jungle.

Bancroft also reports *Hymenochaete noxia* (*Thelephoraceae*) as causing a root disease, and *Fomes lignosus*; and Brooks that Pink Disease has been found on this tree.

Quite recently specimens from Selangor that have presented the symptoms of 'die back' have been collected. A black *Sphaeriaceous* fructification was found on the bark, but the work on these specimens is not yet completed.

CINNAMOMUM INERS, Bl. (*Laurineae*).

Baker reports that he found *Microxyphium tenellum* on dying leaves of this plant in the Singapore Gardens.

CITRUS ACIDA, Roxb. (*Rutaceae*). The Lime Tree.

Although one would expect several pests of this tree to have been collected, the only one recorded is that by Baker from Singapore, namely, *Cladosporium elegans*, var. *singaporensis* (*Dematiaceae*) collected on dying leaves.

CITRUS MEDICA, Linn. (*Rutaceae*). The Citron.

Sphaerostilbe coccophila (*Hypocreaceae*) found by Bancroft is not really parasitic on the tree but on the scale insects which so frequently infest trees of this kind.

CITRUS, sp. (*Rutaceae*).

Brooks reports a case of Pink Disease on the "Lime," but the exact species is not indicated.

CLERODENDRON PENDULIFLORUM, Wall. (*Verbenaceae*).

Tetrachia singularis (*Tuberculariaceae*) is recorded by Baker as being found on living leaves at Singapore.

CLERODENDRON SERRATUM, Spreng. (*Verbenaceae*).

Baker collected *Podosporium penicillium* var. *clerodendri* (*Stilbaceae*) on the leaves of this species. This fungus appears as little white specks on the leaf surface.

CLITORIA CAJANIFOLIA, Benth. (*Leguminosae*).

This is another of the hosts of Pink Disease, recorded by Sharples.

COCOS NUCIFERA, Linn. (*Palmaceae*). The Coconut Palm.

The diseases and pests of this important palm are summarized by R. M. Richards in the Agricultural Bulletin Vol. V, p. 327. A complete list of the fungi found in Malaya so far are:—

Botryodiplodia, sp. (*Sphaerioidaceae*). A cause of die back of the leaves. Stated by Ridley to be a root disease cutting off the water supply, but Richards considers it to be a leaf parasite killing the leaf as it works downwards from the tip.

Bud rot. The most recent work on the fungi concerned in this disease is given in the Philippine Journal of Science Vol. XIV, No. 1, Jan. 1919.

Diplodia, sp. (*Sphaerioidaceae*). Reported by Bancroft on the roots but only secondary on dead parts.

Fomes pseudoferreus (*Polyporaceae*). Found by South on dead stumps and roots.

Fomes lucidus (*Polyporaceae*). Found by South on buried wood.

Fomes pseudoferreus (*Polyporaceae*). Found by South in buried trunks and previously described as *Poria hypolateritia*.

Helminthosporium sp. (*Dematiaceae*). Richards records on the leaves.

Hexagona variegata (*Polyporaceae*). Collected by Burkill from a dead trunk.

Hymenochaete noxia (*Thelephoraceae*). On buried trunks. Recorded by South.

Meliola palmarum (*Perisporiaceae*). A saprophytic sooty mould fungus covering the leaves, and probably due to the presence of scale insects. Its treatment is given by Bancroft in Agricultural Bulletin, F. M. S. Vol. I, p. 110.

Metasphaeria Coccoes (*Sphaeriaceae*). A saprophytic fungus recorded by R. M. Richards on dead leaves.

Pestalozzia palmarum (*Melanconiaceae*). Described by Bancroft as a cause of a spotting of the leaves. These spots finally coalesce and appear like a large grey blister.

Poria hypolateritia (*Polyporaceae*). Described by South as being found in buried trunks. This fungus has since been re-determined as *Fomes pseudoferreus*.

Thielaviopsis sp. (*Dematiaceae*). Recorded originally by Bancroft in the tissues of the stem. Later Richards considers that *T. ethacetica* is the cause of "rusty and black patches (on the stem) from which a brown liquid oozes."

COFFEA, spp. (*Rubiaceae*). Coffee.

Unfortunately the many diseases recorded for this plant in Malay are generally mentioned as occurring only on "Coffee." In only one or two cases has the species or variety of *Coffea* been stated. Consequently it has only been possible to group the following under the generic name.

Ascospora sp. A stem disease of not very great importance.

Capnodium sp. (*Capnodiaceae*). A "sooty-mould" fungus described by Belgrave as being found in association with scale insects on the berries. It is considered harmless except so far as it cuts off the light from the fruit.

Cephalosporium sp. (*Moniliaceae*). Recorded by Belgrave as being parasitic on the spots caused by the leaf fungus *Hemileia*. It appears as a fine glistening white web on the mature spots.

Colleototrichum sp. (*Melanconiaceae*) found by Belgrave on stems. It causes black discoloured areas in which may be seen small knob like protuberances.

Coniothyrium coffeae (*Sphaerioidaceae*). One of the fungi found by Belgrave as being responsible for the large, brown, 'scorched' areas on leaves. The fungus seems able to attack healthy leaves.

Corticium salmonicolor (*Thelephoraceae*). Pink Disease. Recorded by Brooks.

Diplodia sp. (*Sphaerioidaceae*). Found by Belgrave on the stem and occurring as large hairy pustules.

Fusarium sp. (*Tuberculariaceae*). Collected on dead berries. Belgrave states that this fungus appears unable to infect healthy fruits.

Hemileia vastatrix (*Uredinaceae*). A rust. The most widely spread "leaf spot" disease. It first appears as small circular, yellowish, translucent spots, and is rapidly followed by the production on the underside of the leaves of the orange coloured powdery spores.

Hyalopus sp. (*Moniliaceae*). With *Cephalosporium* appearing as glistening patches on *Hemileia* spots.

Hymenochaete noxia (*Thelephoraceae*). Recorded by Bancroft as causing brown root disease.

Irpex flavus (*Hydnaceae*). Considered to cause a root disease. A bright yellow fungus covered with "teeth."

Necator discretus (*Tuberculariaceae*). Mentioned by Ridley as causing a considerable amount of damage to the stem. It appears as "small white specks which seem to develop into leprous pink masses forming patches on the dying twigs."

Pestalozzia coffeae (*Melanconiaceae*). Belgrave records this fungus on the fruits, appearing as little black dots on raised patches.

Phyllosticta coffeicola (*Sphaerioidaceae*). Another of the fungi responsible for the "scorched" appearance of the leaves. Little black pustules are seen on the large brown areas.

Stilbum sp. (*Stilbaceae*). A saprophytic fungus found by Belgrave on dead fruit.

CYRTOPHYLLUM FRAGRANS, D. C., (*Loganiaceae*) Tembusu.

Baker records two fungi on the leaves of this tree, as being found in Singapore. *Septoria cyrtophylli* (*Sphaerioidaceae*) forming light grey spot areas with concentric zones, and covered with black pustules, and *Helminthosporium spirotrichum* (*Sphaerioidaceae*) which forms dense masses of jet black mould chiefly on the under surface of the leaves.

DAEMONOROPS, sp. (*Palniaceae*). Rotan.

Phyllosticta daemonoropsis (*Sphaerioidaceae*) is recorded by Baker from Singapore as being found on the leaves, and appears as brown scorched areas.

Rosellinia ambigens (*Sphaeriaceae*) was found on dead leaves, and occurs as lines of black dots.

DERRIS SINUATA, Thw. (*Leguminosae*).

Asterina trachycarpa (*Perisporiaceae*) a fungus occurring as groups of black dots on the surface of the leaves was collected by Baker in Singapore.

DIANTHUS CHINENSIS, Linn. (*Caryophyllaceae*). Pinks.

The dead calyces collected from specimens at Singapore by Baker were found to have on them *Phyllosticta dubia* (*Sphaerioidaceae*). All that appears of the fungus on the surface is minute black dots chiefly towards the ends of the calyx lobes.

DICTYOSPERMA ALBUM, W. and D. (*Palmaceae*).

Phyllosticta palmigena (*Sphaerioidaceae*) collected from dying leaves, by Baker at Singapore. It appears as white scorched areas surrounded by dark brown or black borders.

DIOSCOREA, sp. (*Dioscoreaceae*). The Yam.

Stilbum incarnatum (*Stilbaceae*). Collected on rotting roots by Baker at Singapore. In dried specimens the red colour of the young united spore stalks is long retained, and is characteristic of the groups of fructifications.

DURIO ZIBETHINUS, D. C. (*Malvaceae*). The Durian.

Brooks records an instance of Pink Disease, and Baker the occurrence of *Gloeosporium zibethinus* (*Melanconiaceae*) on the

leaves. In the dried material the leaves have 'scorched' spots or areas, spotted with black dots and surrounded by dark brown borders.

EUGENIA CARYOPHYLLATA, Thunb. (*Myrtaceae*). The Clove.

Irpex flavus, a yellow "toothed" fungus (*Hydnaceae*) is reported by Bancroft as causing a root disease. Ridley states that a red-spotting leaf fungus, probably a member of the *Peronosporaceae*, was responsible for abandoning the clove cultivation about 1860.

EUGENIA GRANDIS, Wt. (*Myrtaceae*). Jambu Ayer Laut.

Valsaria cinnamomi (*Sphaeriaceae*) on dead bark, collected by Baker at Singapore. The fructifications of the fungus appear as dark brown or black eruptions through fissures of the bark.

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(To be continued).

Some Trials of Food Plants in the Economic Gardens II.

Lima Beans (*Phaseolus lunatus*).

The Lima Beans, Small Siéva Pole, originally received from the firm of A. H. Dreer, Philadelphia, U. S. A., and which were reported upon at length in the Garden's Bulletin of 4th July 1919, have been kept under cultivation continually in the Economic Gardens since July 1918. It was shown, by the records of seed gathered up to, and inclusive of the fourth generation, that the crops had been well maintained and that the beans had not degenerated in weight, size or quality.

But the results since obtained do not confirm this; they in fact have disappointed the writer's expectations. It is not, however, yet time to ascribe the falling off in the subsequent crops to actual degeneration in the seed, for, in recent weighings taken in October 1919, it was found that the weight of the beans was well maintained, and the percentage of germinations on a plot of 1056 plants, sown on 28th October, the last of the season, was as high as 96 per cent. At the time of writing (22nd November) this plot shows the most vigorous and healthy growth, a fact which would exclude any tendency to degeneration.

To explain the discrepancy between this last statement and the disappointing results of the crop as a whole, it is necessary to refer to the locality where the trials were made. The area planted in Lima beans was a little over two acres consisting (all but a small part of 4000 square feet, or one eleventh of an acre) of a low strip of land skirting a hill, and made of drift soil, either washed from